DOCUMENT RESUME

ED 220 093 IR 010 313

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TITLE Microcomputers--A Way for Teachers to Cope.
PUB DATE 81
NOTE 8p.
JOURNAL CIT British Journal of In-Service Education; v7 n3 p203-08 Sum 1981

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; Demonstrations (Educational); *Educational Technology; *Inservice Teacher Education; *Learning Modules; *Microcomputers; Online Systems; *Videotape Recordings
IDENTIFIERS Hertfordshire Advisory Council Educational Tech

ABSTRACT

An approach to teacher inservice training in the use of computer-based learning is described in this paper, with specific discussion devoted to the development of a videotape training module by the Hertfordshire Advisory Council for Educational Technology (HACET) to demonstrate the role of educational technology, and in particular microcomputers, in the classroom. A general consideration of microcomputers and their applications in educational technology is followed by a detailed account of the design and preparation of the HACET learning module and of the steps involved in preparing a videotape of a classroom microcomputer demonstration. Accompanying the text are five diagrams. (Author/JL)

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MICROCOMPUTERS--A WAY FOR TEACHERS TO COPE

by

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and

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Microcomputers – A Way for Teachers to Cope

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Although everyone is currently being bombarded with publicity about the micro-electronics revolution most people are only aware of insignificant applications of this technology. The subtle and fundamental effects on the structure of society governing the way in which we live are not obvious. Education is no exception to the effects of this revolution and many teachers are unaware of implied changes in the curriculum and also in methods of teaching.

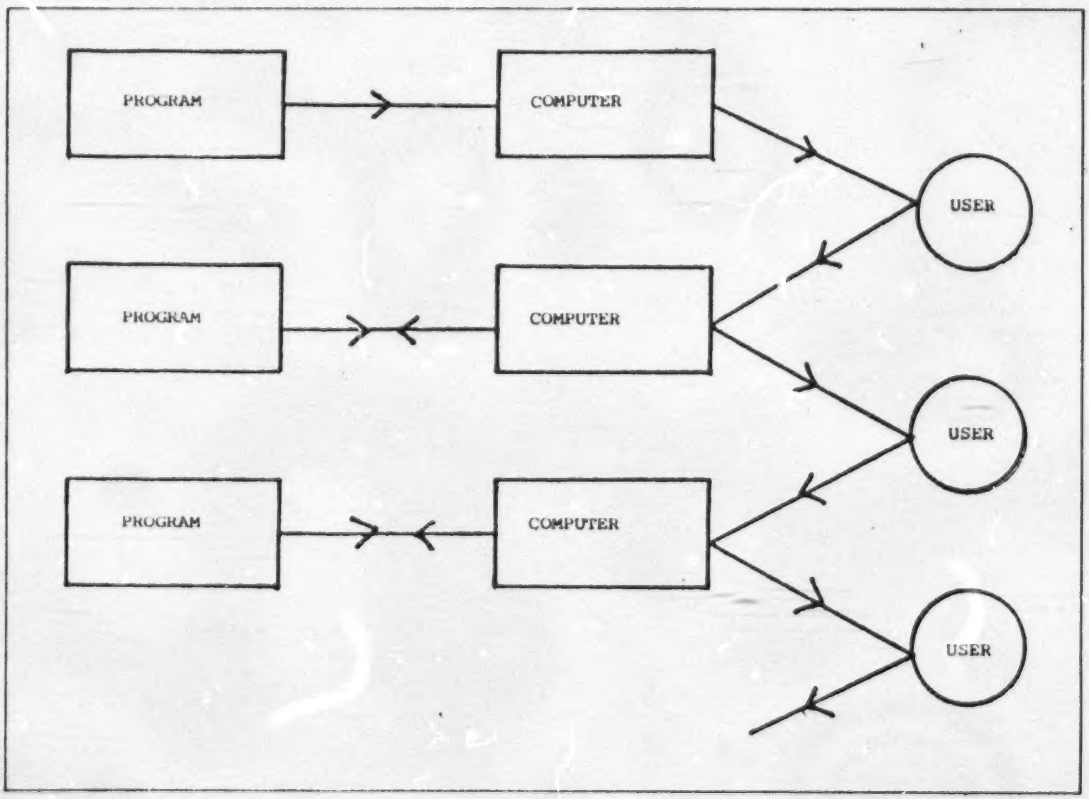
As far as changing the way that teachers teach and children learn, computers provide an *interactive* form of learning in a way that no other resource can do. Diagram 1 attempts to explain this.

Within this communications model the user receives initial information from the program and responds to the program through the medium of the computer. The program uses this response to determine it's reaction. This program/user interaction continues as the program runs.

This form of interaction enables new learning techniques to be introduced which have the potential to change the boundaries of knowledge. These learning techniques include simulation of experience impossible to achieve inside the classroom; using and changing models to explain ideas and observations; and the testing of personal hypotheses using information retrieval techniques.

A microcomputer used in the ways indicated above is 'enabling' educational processes to take place and therefore it does not appear as an object of study

Diagram 1



in its own right – it is simply there as a means of supporting and extending learning activities. Conceived in this way the use of microcomputers could be subject to the same sort of problems associated with any form of educational technology.

We have identified six areas of difficulty which face the teacher using educational technology:–

(i) Educational Technology, unlike a specific discipline, has a role to play relevant to the whole curriculum and therefore can only be defined in operational terms. For many teachers this idea presents a genuine conceptual leap.

(ii) Until recently there has been no real consideration of software's contribution to Educational Technology apart from its use to enable the hardware to function. Such a view of software's role has generated a misconception of the character of educational technology – encouraging the emphasis to be on operational competence at the expense of educational use.

(iii) Traditionally Educational Technology is seen purely in a role supporting conventional approaches to teaching, with little regard, if any, paid to its inovatory capacity.

(iv) The conventional emphasis on operational competence has tended to produce a reluctance amongst teachers to use, let alone experiment with, Educational Technology.

(v) Users committed to one form of Educational Technology very often lack the motivation to use another form.

(vi) Some users of educational technology lack the critical appraisal necessary to make decisions as to when the use of Educational Technology is educationally legitimate.

We feel that many of these problems are relevant to microcomputers:-

(i) Computers have traditionally been seen within a Computer Studies context. This makes it more difficult for them to be conceived of in an educational technology role.

(ii) Computers are often used for their own sake, with little attempt made to justify their use on purely educational grounds. This generates a disregard for the software. This problem is accentuated in the case of the microcomputer because currently there is relatively generous hardware provision and only a limited amount of good software. This situation encourages a pre-occupation with hardware.

(iii) As with other forms of educational technology teachers are looking for ways to use microcomputers which are merely substitutes for things which are already being done, rather than exploiting the microcomputer's capabilities for producing change. This tends to belittle the credibility of using the microcomputer across the curriculum.

(iv) Many people instinctively fear computers. Consequently there is a pre-occupation with operational competency which makes the emphasis on the use of hardware even more significant.

(v) The characteristics of teachers who have previously made a commitment to some aspect of educational technology do not necessarily mean that they will be sympathetic to the use of a microcomputer. In fact their previous experience may be detrimental to their appreciation of computer based education.

(vi) The conception that any use of microcomputers as an educational resource is axiomatically applicable tends to create trivial and on occasions educationally destructive uses of microcomputers.

From the above list it would seem appropriate to consider the educational implications of the use of microcomputers within the accumulated experience of educational technology. Therefore by disseminating the educational technologists' answers to these problems a realistic framework could be formed in which teachers could develop their use of microcomputers. Such attempts at dissemination have significant implications to those involved in In-Sevice Training.

Hertfordshire Education Authority has attempted to produce a scheme for In-Service Training in Educational Technology and it has become apparent that the essential problems associated with a scheme such as this are:–

1. The need to develop a general awareness within the teachers of the role educational technology plays in the classroom.
2. To break down the subject orientated preconceptions on which some teachers base their evaluation of educational technology.
3. To co-ordinate the contributions from the various institutions concerned with educational technology in the County.

Hertfordshire Advisory Council for Educational Technology (HACET) was born in 1977 and amongst its aims were to consider and advise on future planning and to co-ordinate all individuals and groups with an

interest in educational technology. In-service training was an area of specific responsibility for which a sub-committee was formed.

The committee organised a seminar to discuss the activities of HACET in general and In-Service Training in detail, with a view to defining the initial stages of a training programme. The remainder of this article deals with the practical developments of one approach which was formulated in depth with reference to microcomputers.

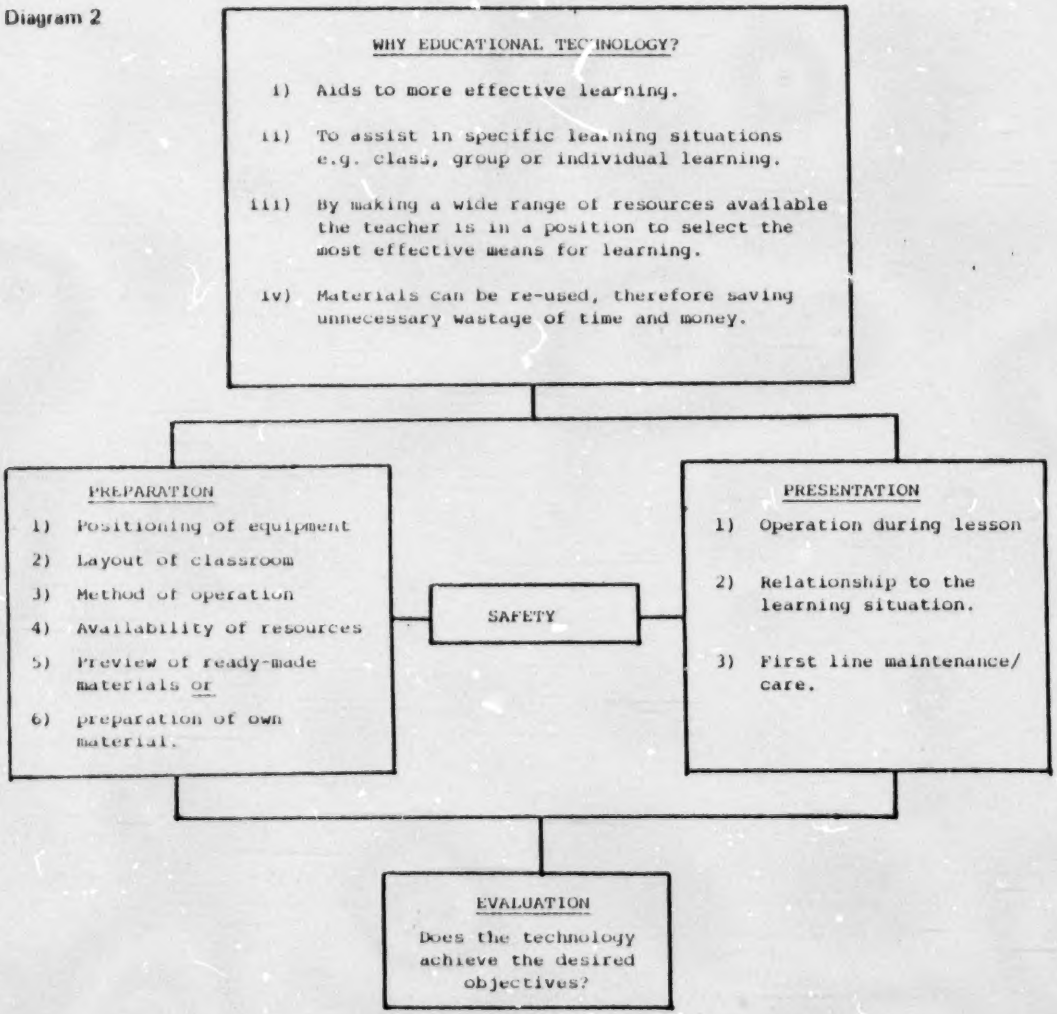
The essential aim of this approach was to provide a training module in which the uses of hardware and software were fundamentally linked. Diagram 2 shows the idea behind the approach.

After considering whether educational technology is an appropriate approach in this context, its use is considered in terms of *preparation* before the lesson, *presentation* during the lesson, and *evaluation* after the lesson has taken place.

The specific application which was considered was the use of a computer assisted learning (CAL) program. We considered what any subject teacher needed to know in order to use such programs effectively. Diagram 3 attempts to state these requirements with respect to the ideas shown on Diagram 2.

This was all very well as a hypothetical exercise, but would such an approach work using an apparently

Diagram 2


WHY EDUCATIONAL TECHNOLOGY?
i) Aids to more effective learning.
ii) To assist in specific learning situations e.g. class, group or individual learning.
iii) By making a wide range of resources available the teacher is in a position to select the most effective means for learning.
iv) Materials can be re-used, therefore saving unnecessary wastage of time and money.
PREPARATION
1) Positioning of equipment
2) Layout of classroom
3) Method of operation
4) Availability of resources
5) Preview of ready-made materials or
6) preparation of own material.
SAFETY
PRESENTATION
1) Operation during lesson
2) Relationship to the learning situation.
3) First line maintenance/ care.
EVALUATION
Does the technology achieve the desired objectives?

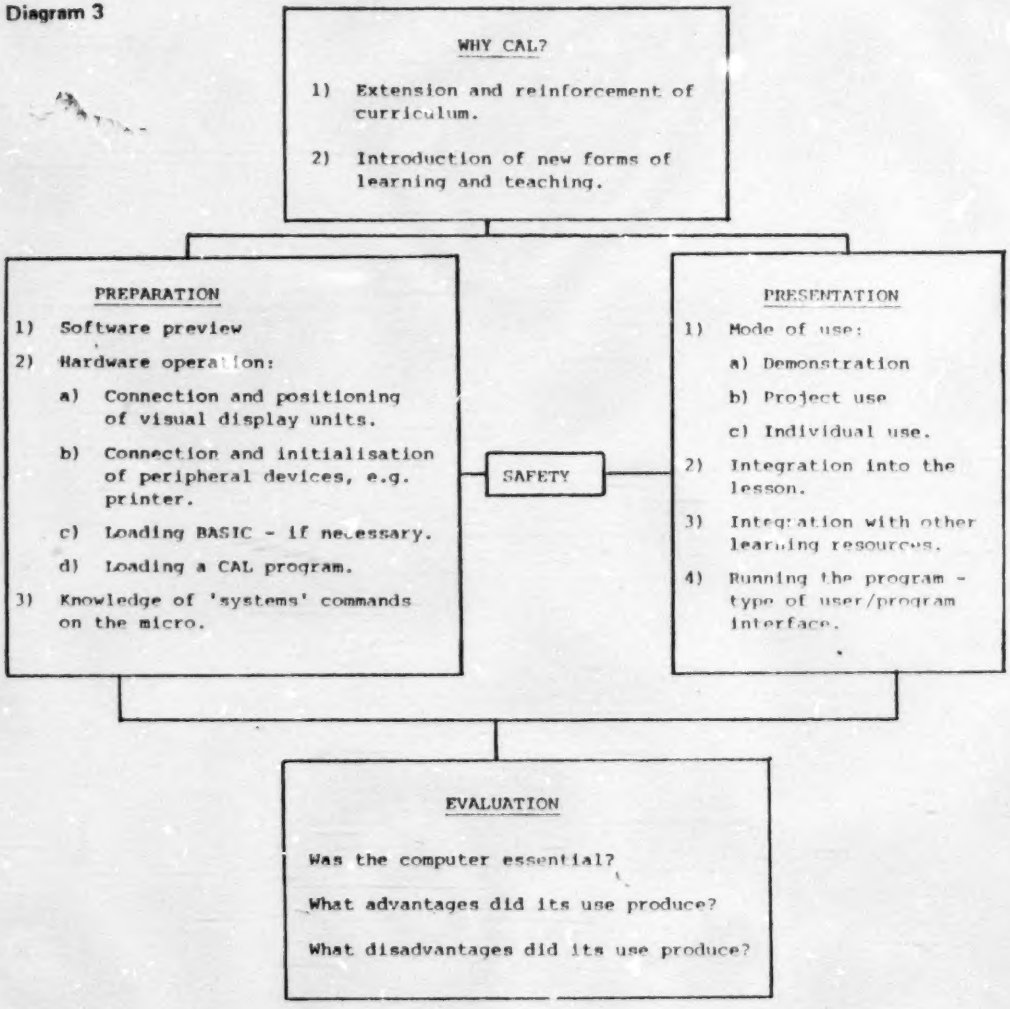
complicated piece of technology like a microcomputer? We decided to put it to the test.

To record the implementation of this approach we undertook a classroom observation. This observation was recorded using three video cameras and two microphones; one camera was used to record directly the output of the microcomputer. We felt that information we recorded was representative of our conception of the problems and also showed the potential of the classroom use of educational technology. In the light of the above we decided to produce an in-service training programme demonstrating the use of Educational Technology in general, and of CAL specifically, which was based upon this record of our observations. The programme was designed to emphasise our theoretical approach to educational technology.

The specific CAL unit used was concerned with the siting of a motorway. It was used by a geography teacher in a third year humanities course in one of Hertfordshire's comprehensive schools. (Note 2)

In Diagram 3 we attempted to consider a structure for using Educational Technology which identified particular factors which a teacher should consider before, during, and after using a microcomputer. The need for adequate preparation by the teacher was emphasised in the programme during the introductory sequence. The teacher was shown previewing teach-

Diagram 3


WHY CAL?
1) Extension and reinforcement of curriculum.
2) Introduction of new forms of learning and teaching.
PREPARATION
1) Software preview
2) Hardware operation:
a) Connection and positioning of visual display units.
b) Connection and initialisation of peripheral devices, e.g. printer.
c) Loading BASIC - if necessary.
d) Loading a CAL program.
3) Knowledge of 'systems' commands on the micro.
SAFETY
PRESENTATION
1) Mode of use:
a) Demonstration
b) Project use
c) Individual use.
2) Integration into the lesson.
3) Integration with other learning resources.
4) Running the program - type of user/program interface.
EVALUATION
Was the computer essential?
What advantages did its use produce?
What disadvantages did its use produce?

ing materials which included overhead projector transparencies, photographic slides and the computer program. The video programme commentary stated that the teacher was considering how to use these different types of resources in an integrated fashion. As a microcomputer program was a relatively new experience she was shown taking particular care in her preview of the program. At the same time the teacher had the opportunity to familiarise herself with the basic operation of the equipment and to think carefully about the effect that hardware constraints have on classroom management and lesson preparation. She decided to use the microcomputer in conjunction with an overhead and filmstrip projector following the 'demonstration' mode of use (Diagram 3).

The decision to use the equipment in demonstration mode imposes particular contraints upon lesson presentation and classroom organisation. The lesson presentation was designed to actively involve the children in the use of the various resources. Diagram 4 demonstrates how the teacher effects a communication between her class and the technology. In this particular case she has decided that at some stage in her classroom practice the class members will be divided into a series of working groups enabling her to use their direct experiences in conjunction with the relevant resource.

Bearing all these factors in mind she decided to arrange her classroom in the way shown in Diagram 5. As well as enabling her to use the various resources easily and efficiently this classroom organisation permitted group activities to develop naturally.

The remainder of the video programme is an edited version of the initial classroom observation designed to highlight the approach outlined in this article. Although decisions had to be taken in making the videotape, in order to condense two hours of classroom practice, we hope that the result is a true reflection of the teacher's experience.

We intend that the video programme will be used as an in-training resource in conjunction with a demonstration of the microcomputer and in general discussion of the use of Educational Technology.

Notes

1. We have used *program* to refer to a set of instructions for a computer, and *programme* to refer to a structured video tape recording.
2. St. Michael's R.C. School, Watford.

Diagram 4

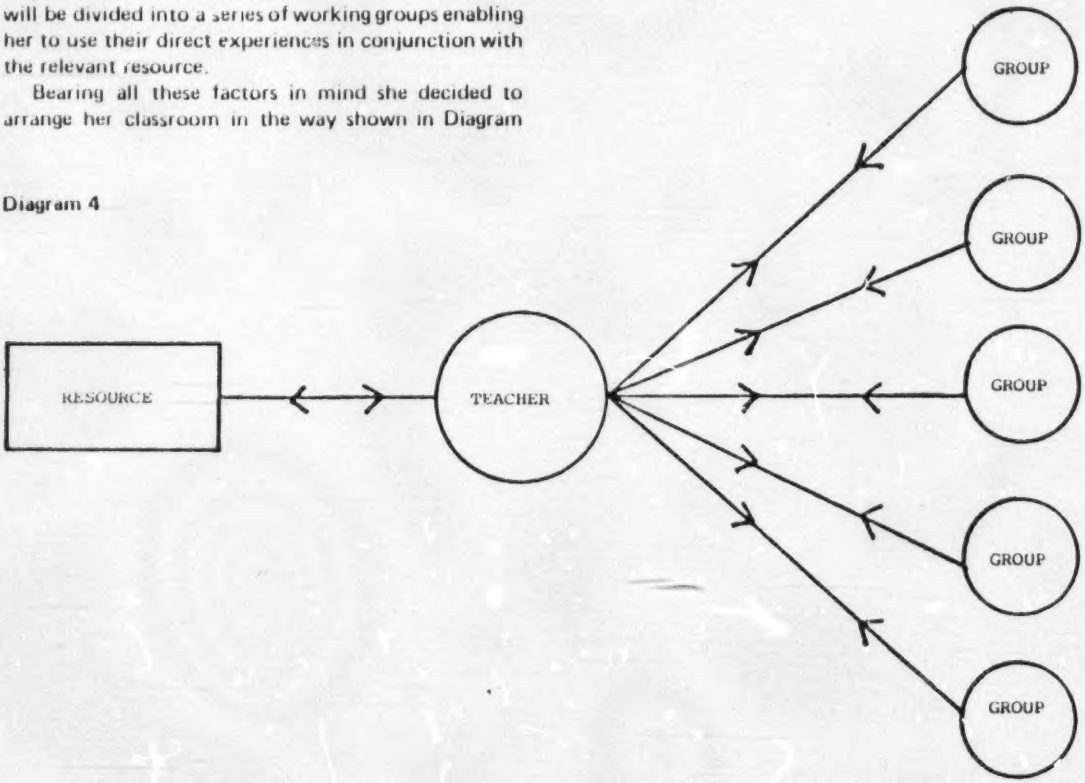
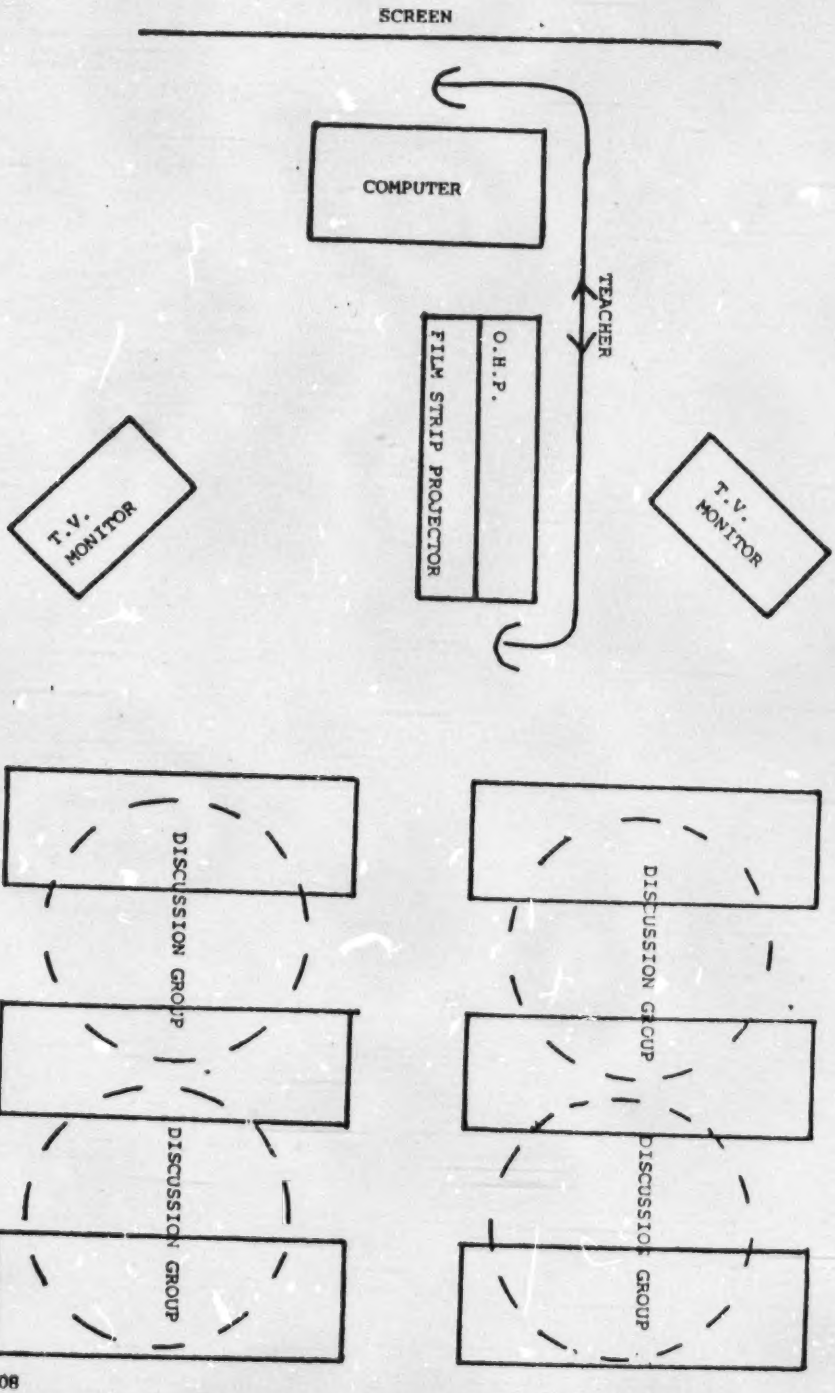


Diagram 5


SCREEN
COMPUTER
TEACHER
O.H.P.
FILM STRIP PROJECTOR
T.V. MONITOR
T.V. MONITOR
DISCUSSION GROUP
DISCUSSION GROUP
DISCUSSION GROUP
DISCUSSION GROUP